

A UNITED STATES
DEPARTMENT OF
COMMERCE
PUBLICATION



PRECIPITATION PROBABILITY FORECASTS

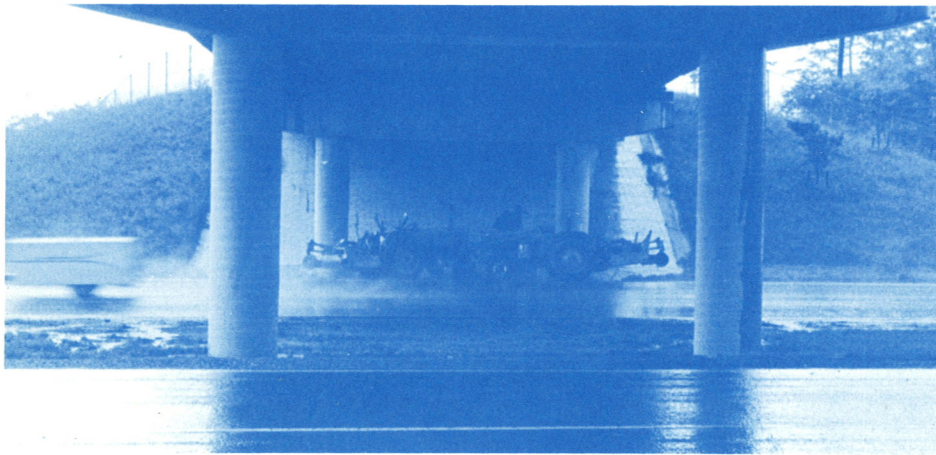
U.S. DEPARTMENT
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Environmental
Science Services
Administration



Precipitation Probability Forecasts

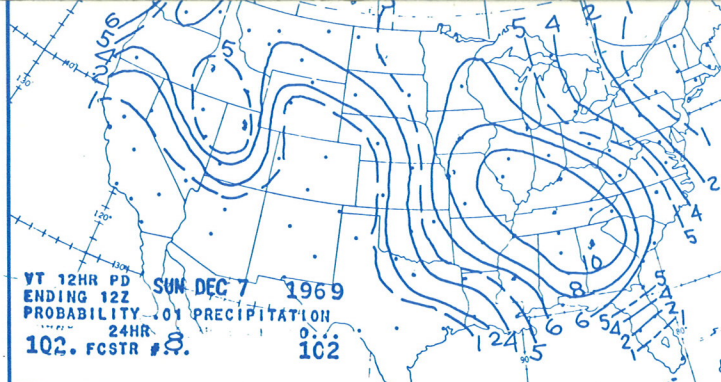
For most people, all a satisfactory weather forecast has to do is tell them whether it will be rain (or snow or sleet or slush) or shine, above or below freezing, good weather or bad. The answers to the last two items are available and reliable. The rain or shine question is more difficult to answer because of the number of complex weather processes involved. The best answer available today is the ESSA Weather Bureau's precipitation probability forecast, a product which becomes more useful as it is more thoroughly understood.

Some view the precipitation probability forecast as an intrusion of cold mathematics into a traditionally human activity—Poor Richard displaced by a high-speed computer. Others see it as a way of burdening the citizen with the responsibility for weather-related decisions. Actually, the probability forecast is intended to elaborate the basic prediction, giving the user the benefit of the weatherman's knowledge of the degree of uncertainty in the situation. In effect, the forecast translates the difference between a remote chance and a virtually sure thing into numerical terms.

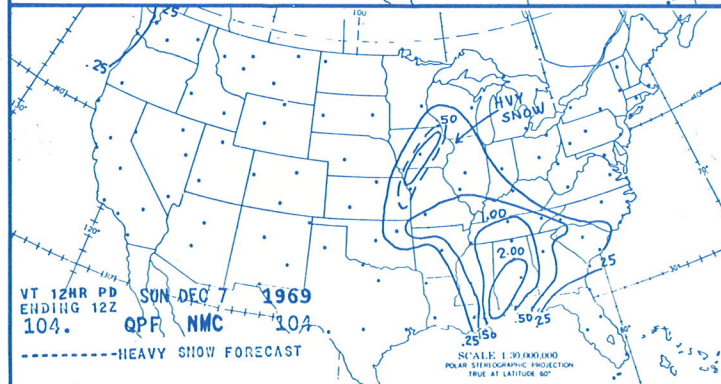


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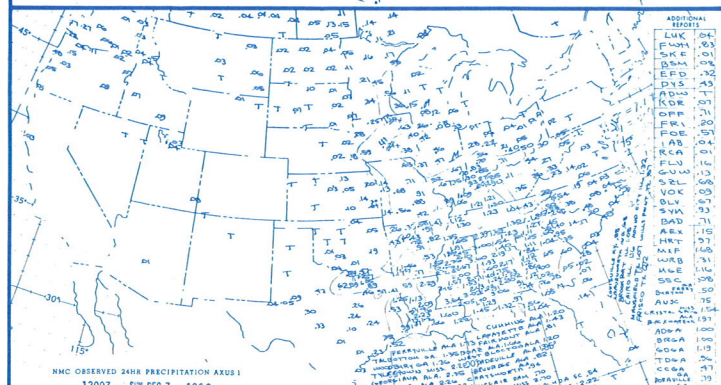
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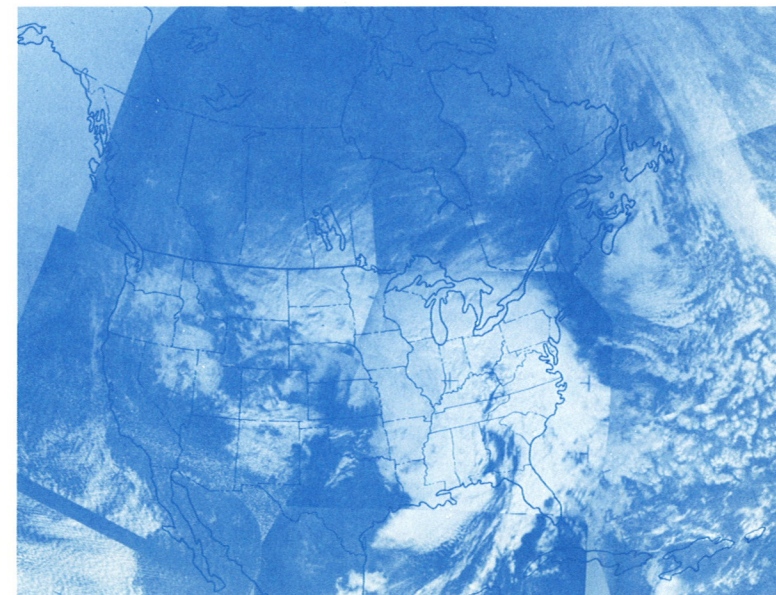
(1)



(2)



(3)



The precipitation probability forecasts you get in newspapers and on the radio and television come from your local Weather Bureau office. The maps and millions of bits of guidance data from the National Meteorological Center (NMC) are just that—guidance. To develop a local forecast, your weatherman must rely also on his talent and experience and knowledge of the territory.

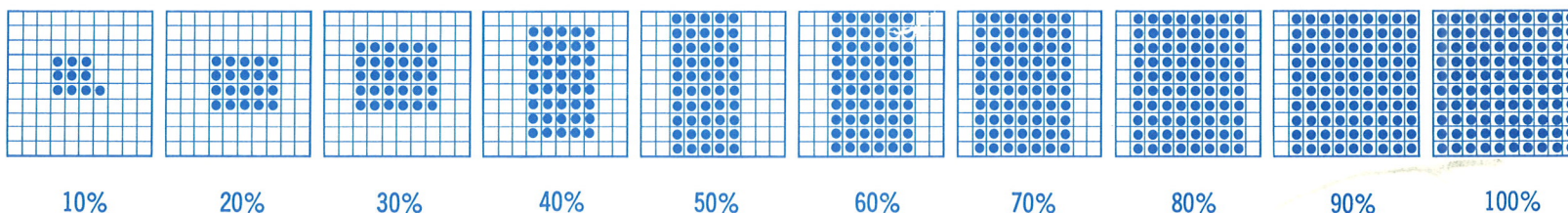
The precipitation probability forecast (1) and a quantitative precipitation forecast (2) show what was forecast by NMC for the 12-hour period ending at 7 a.m. EST, December 7, 1969. A verification chart (3) shows that such probability forecasts are close to the mark—but much remains to be learned about how to make these numbers closer to the "perfect" 0 and 100 percent prediction. Cloud cover over the United States near the end of the forecast period is shown in the composite ESSA satellite photograph.

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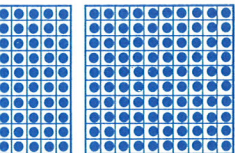
Forecast Precipitation Probability	Forecaster's Range of Probabilities	Qualifying Forecast	Meaning:
near zero 2% 5% 10%	less than 2% 2-5% 5-8% 8-15%	Usually no mention of precipitation.	In 1 or less
20%	15-25%	Slight or small chance of	In 2
30% 40% 50%	25-35% 35-45% 45-55%	Chance of	In 3 4 5
60% 70%	55-65% 65-75%	Likely that	In 6 7
80% 90% near 100%	75-85% 85-95% 95% or better	No qualifying forecast term; precipitation virtually assured.	In 8 9

cases out of
 10 such,
 at least
 0.01 inch of
 precipitation will
 occur at any point
 in the forecast
 area within the
 forecast period



The term "probability"

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0%

100%

refers to the chance an event will occur, represented as a number between zero, the probability of an impossible event, and one (or 100 percent), the probability of an inevitable one. As applied to precipitation forecasting, probability is the percentage chance that at least one one-hundredth inch of precipitation—rain or the liquid equivalent of snow or other frozen precipitation—will fall at any selected point in the area and time period covered by the forecast.

Applied to making weather-related decisions, a 70 percent probability indicates a 7 in 10 chance of precipitation, and a 3 in 10 chance of no precipitation, at any location in the forecast area. A 30 percent probability suggests only a 3 in 10 chance of precipitation. In general, the forecasts cover 12-hour periods (sometimes refined after the first six hours) and moderate-sized metropolitan areas. Usually no differentiation is made for points within the forecast area.

The chance of a shower touching you in the area covered by the forecast is the product of two quantities: the probability that a precipitation-producing storm will develop or move into the area and the percent of the area which the storm is expected to cover. Thus in the summer when storms tend to be more isolated or scattered in nature, the probability that your immediate area will get rain tends to be smaller than in winter.

Probabilities may be low any time of the year, however, because the entire area covered by the forecast is not expected to be affected. For example, a forecaster can have a high degree of confidence that a storm will move through the area (say 80 percent), but that not all of the area will be affected. Although he cannot predict exactly where precipitation will occur, he can read the weather patterns well enough to say that perhaps 40 percent of the area will be affected. Here the product of storm probability (.80) and expected coverage (.40) is 32 percent (.32), and the forecast will call for a 30 percent chance of precipitation. Precipitation is nearly certain; but the chance it will affect you, wherever you are in the forecast area, is only three in ten.





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